CLAIMS

1.   A method for generating extensible metadata, the method comprising:

compiling source code to generate an assembly; and

during compiling operations, emitting metadata and extensible metadata into the assembly, the extensible metadata describing standard and non-standard metadata that represents an extension to standard metadata.

2.   A method as recited in claim 1, wherein the extensible metadata is self-describing and further describes table layout information, data type definitions, code classes, members, and/or class inheritance information for both standard and non-standard metadata.

3.   A method as recited in claim 1, wherein the extensible metadata further comprises table layout information, data type definitions, code classes, members, and/or class inheritance information.

4.   A method as recited in claim 1, wherein the extensible metadata further comprises table layout information, data type definitions, code classes, members, and/or class inheritance information.

5.   A method as recited in claim 1, wherein the extension includes design-time information, a value array, and/or generics extensible metadata.

6. A method as recited in claim 1, wherein the extensible metadata further comprises table layout information, data type definitions, code classes, members, and/or class inheritance information.

7. A method as recited in claim 1, wherein compiling further comprises enforcing data format and table relationships in the extensible metadata with a extensible metadata schema, the extensible metadata schema differentiating standard metadata tables from non-standard extensible metadata tables.

8. A method as recited in claim 1, wherein compiling further comprises tagging the extensible metadata such that is can be differentiated by a metadata consumer from the standard metadata.

9. A method as recited in claim 1, wherein compiling further comprises enforcing data format and table relationships in the extensible metadata with a extensible metadata schema, the extensible metadata schema differentiating standard metadata tables from non-standard extensible metadata tables.

10. A method as recited in claim 1, wherein compiling further comprises generating, by a primary compiler, a string heap to store character strings associated with the extensible metadata.

11.   A method as recited in claim 1, wherein emitting the metadata further comprises interfacing with an Application Programming Interface exposed by a runtime.

12.   A method as recited in claim 1, wherein the extensible metadata comprises a MetaColDef table for identifying layout of one or more tables, the MetaColDef table comprising, for each table of the tables: a tag indicating that the table is extensible metadata, a substantially unique table identifier, data type associated with each column in the table, and/or table name and width.

13.   A method as recited in claim 1, wherein the extensible metadata comprises a MetaToks table comprising one or more metadata tokens to index a metadata table or a metadata heap, each EM token indicating an indexed table and a row number of the indexed table.

14.   A method as recited in claim 1, wherein the extensible metadata comprises a MetaCodedToks comprising one or more coded tokens, and for each coded token: an assigned number, a byte offset into a extensible metadata string heap to a corresponding name, a number of elements in a set of tokens being defined.

15.   A method as recited in claim 1, wherein the extensible metadata comprises a MetaCodedVals table comprising type reference, type definition, type specification, field, and property information for extensible metadata coded tokens.

16.   A method as recited in claim 1, wherein the extensible metadata comprises a MetaFeatures table comprising information for one or more new features, the information for each feature comprising a feature number, a substantially unique feature ID, a name of the feature.

17.   A method as recited in claim 1, wherein a table described by the extensible metadata is associated with a new feature, the extensible metadata further comprising at least one suggested action for a metadata consumer to take with respect to the new feature, the at least one suggested action indicating the metadata consumer must understand semantics of the new feature or may safely ignore the new feature.

18.   A method as recited in claim 1, wherein the extensible metadata comprises multiple respective rows of data, each row being tagged as extended, and wherein the extensible metadata further comprises uses-feature information for each row of the multiple respective rows, the information identifying a specific table and table row, a feature number associated with an extension identified by the table row, and an indication of one or more metadata consumer types that should understand the extension to properly function.

19.   A method as recited in claim 18, wherein the one or more metadata consumer types comprise a browser, a linker, a compiler, and/or a runtime.

20. A method as recited in claim 1, further comprising:

loading, by a metadata consumer, the assembly into memory;

interrogating, by the consumer, the runtime to discover presence of the extensible metadata, properties, and/or representation of the extensible metadata.

21. A method as recited in claim 20, wherein the loading and the interrogating are performed independent of modification to the consumer.

22. A method as recited in claim 1, wherein loading and interrogating are performed by interfacing with an Application Programming Interface exposed by a runtime.

23. A method as recited in claim 20, wherein interrogating further comprises discovering data type definitions for a specific one of multiple extended features provided by the extensible metadata.

24. A method as recited in claim 20, wherein interrogating further comprises determining at least one suggested action to direct the consumer with respect to use of the extensible metadata.

25. A computer-readable medium for extensible metadata, the computer-readable medium comprising computer-program executable instructions executable by a processor for:

compiling source code to generate an assembly;

during compiling operations, emitting metadata and extensible metadata into the assembly, the extensible metadata representing non-standard metadata that represents an extension to standard metadata; and

wherein the extensible metadata is self-describing to a extensible metadata consumer, the extensible metadata comprising information to describe non-standard table layout information, data type definitions, code classes, members, and/or class inheritance information.

26. A computer-readable medium as recited in claim 25, wherein the extensible metadata comprises multiple respective rows of data, each row being tagged as extended, and wherein the extensible metadata further comprises uses-feature information for each row of the multiple respective rows, the information identifying a specific table and table row, a feature number associated with an extension identified by the table row, and an indication of one or more metadata consumer types that should understand the extension to properly function.

27. A computer-readable medium as recited in claim 26, wherein the one or more metadata consumer types comprise a browser, a linker, a compiler, and/or a runtime.

28. A computer-readable medium as recited in claim 25 wherein non-standard table layout information, data type definitions, code classes, members, and/or class inheritance information is included in a MetaColDef table for identifying layout of one or more tables, the MetaColDef table comprising, for each table of the tables: a tag indicating that the table is extensible metadata, a substantially unique table identifier, data type associated with each column in the table, and/or table name and width.

29. A computer-readable medium as recited in claim 25 wherein non-standard table layout information, data type definitions, code classes, members, and/or class inheritance information is included in a MetaToks table comprising one or more metadata tokens to index a metadata table or a metadata heap, each token indicating an indexed table and a row number of the indexed table.

30. A computer-readable medium as recited in claim 25 wherein non-standard table layout information, data type definitions, code classes, members, and/or class inheritance information is included in a MetaCodedToks comprising one or more coded tokens, and for each coded token: an assigned number, a byte offset into a extensible metadata string heap to a corresponding name, a number of elements in a set of tokens being defined.

31.   A computer-readable medium as recited in claim 25 wherein non-standard table layout information, data type definitions, code classes, members, and/or class inheritance information is included in a MetaCodedVals table comprising type reference, type definition, type specification, field, and property information for extensible metadata coded tokens.

32.   A computer-readable medium as recited in claim 25 wherein non-standard table layout information, data type definitions, code classes, members, and/or class inheritance information is included in a MetaFeatures table comprising information for one or more new features, the information for each feature comprising a feature number, a substantially unique feature ID, a name of the feature.

33.   A computer-readable medium as recited in claim 25 wherein the non-standard table layout information, the data type definitions, the code classes, members, and/or the class inheritance information is described in one or more tables that self-describe at least one new feature, at least one table of the tables indicating a suggested action for a metadata consumer to take with respect to the new feature, the suggested action directing the metadata consumer that it must understand semantics of the new feature or may safely ignore the new feature.

34.   A computer-readable medium as recited in claim 25, wherein the computer-program instructions for compiling further comprise instructions for enforcing data format and table relationships in the extensible metadata with a extensible metadata schema, the extensible metadata schema differentiating standard metadata tables from non-standard extensible metadata tables.

35.   A computer-readable medium as recited in claim 25, wherein the computer-program instructions for compiling further comprise instructions for tagging the extensible metadata such that is can be differentiated by a metadata consumer from the standard metadata.

36.   A computer-readable medium as recited in claim 25, wherein the computer-program instructions for compiling further comprise instructions for enforcing data format and table relationships in the extensible metadata with a extensible metadata schema, the extensible metadata schema differentiating standard metadata tables from non-standard extensible metadata tables.

37.   A computer-readable medium as recited in claim 25, wherein the computer-program instructions for compiling further comprise instructions for generating, by a primary compiler, a string heap to store character strings associated with the extensible metadata.

38. A computer-readable medium as recited in claim 25, further comprising computer-program instructions for utilizing the extensible metadata in a common language runtime computing environment.

39. A computer-readable medium as recited in claim 25, further comprising computer-program instructions for:

loading, by a metadata consumer, the assembly into memory;

interrogating, by the consumer, the runtime to discover presence of the extensible metadata, properties, and/or representation of the extensible metadata.

40. A computer-readable medium as recited in claim 39, wherein the computer-program instructions for interrogating further comprise instructions for discovering data type definitions for a specific one of multiple extended features in the extensible metadata.

41. A computer-readable medium as recited in claim 39, wherein the computer-program instructions for interrogating further comprise instructions for determining at least one suggested action to direct the consumer with respect to use of the extensible metadata.

42. A computer-readable medium as recited in claim 39, wherein the computer-program instructions for loading and interrogating are performed independent of modification to the consumer.

43.   A computing device for extensible metadata, the computing device comprising:

a processor; and

a memory coupled to the processor, the memory comprising computer-program instructions executable by the processor for:

enforcing data format and table relationships in extensible metadata with a extensible metadata schema, the extensible metadata representing non-standard metadata for at least one new feature that is not found in standard metadata, the extensible metadata schema providing information to differentiate standard metadata from non-standard extensible metadata; and

emitting the extensible metadata into an assembly.

44.   A computing device as recited in claim 43, wherein the extensible metadata is self-describing to a extensible metadata consumer, the extensible metadata comprising non-standard table layout information, data type definitions, code classes, members, and/or class inheritance information.

45.   A computing device as recited in claim 43, wherein the computer-program instructions for enforcing the data format further comprise instructions for tagging the extensible metadata such that is can be differentiated by a metadata consumer from the standard metadata.

46.   A computing device as recited in claim 43, wherein the computer-program instructions for enforcing further comprise instructions for generating a string heap to store character strings associated with the extensible metadata.

47.   A computing device as recited in claim 43, wherein the extensible metadata comprises a MetaColDef table for identifying layout of one or more tables, the MetaColDef table comprising, for each table of the tables: a tag indicating that the table is extensible metadata, a substantially unique table identifier, data type associated with each column in the table, and/or table name and width.

48.   A computing device as recited in claim 43, wherein the extensible metadata comprises a MetaToks table comprising one or more metadata tokens to index a metadata table or a metadata heap, each metadata token indicating an indexed table and a row number of the indexed table.

49.   A computing device as recited in claim 43, wherein the extensible metadata comprises a MetaCodedToks comprising one or more coded tokens, and for each coded token: an assigned number, a byte offset into a extensible metadata string heap to a corresponding name, a number of elements in a set of tokens being defined.

50.   A computing device as recited in claim 43, wherein the extensible metadata comprises a MetaCodedVals table comprising type reference, type definition, type specification, field, and property information for extensible metadata coded tokens.

51.   A computing device as recited in claim 43, wherein the extensible metadata comprises a MetaFeatures table comprising information for one or more new features, the information for each feature comprising a feature number, a substantially unique feature ID, a name of the feature.

52.   A computing device as recited in claim 43, wherein the extension introduces a new feature, and wherein the extensible metadata further comprises at least one suggested action for a metadata consumer to take with respect to the new feature, the at least one suggested action indicating the metadata consumer must understand semantics of the new feature or may safely ignore the new feature.

53.   A computing device as recited in claim 43, wherein the extensible metadata comprises multiple respective rows of data, each row being tagged as extended, and wherein the extensible metadata further comprises uses-feature information for each row of the multiple respective rows, the information identifying a specific table and table row, a feature number associated with an extension identified by the table row, and an indication of one or more metadata consumer types that should understand the extension to properly function.

54.   A computing device as recited in claim 53, wherein the one or more metadata consumer types comprise a browser, a linker, a compiler, and/or a runtime.

55.   A computing device as recited in claim 43, further comprising computer-program instructions for:

loading, by a metadata consumer, the assembly into memory;

interrogating, by the consumer, the assembly to discover presence of the extensible metadata, properties, and/or representation of the extensible metadata.

56.   A computing device as recited in claim 55, wherein the computer-program instructions for loading and interrogating are performed independent of modification to the consumer.

57.   A computing device as recited in claim 55, wherein the computer-program instructions for interrogating further comprise instructions for discovering data type definitions for a specific one of multiple extended features provided by the extensible metadata.

58.   A computing device as recited in claim 55, wherein the computer-program instructions for interrogating further comprise instructions for determining at least one suggested action to direct the consumer with respect to use of the extensible metadata.

59.	A computing device for extensible metadata, the computing device comprising:

means for enforcing data format and table relationships in extensible metadata with a extensible metadata schema, the extensible metadata representing non-standard metadata for at least one new feature that is not found in standard metadata, the extensible metadata schema providing information to differentiate standard metadata from non-standard extensible metadata;

means for emitting the extensible metadata into an assembly; and

wherein the extensible metadata is self-describing to a extensible metadata consumer, the extensible metadata comprising non-standard table layout information, data type definitions, code classes, members, and/or class inheritance information.

60.	A computing device as recited in claim 59, wherein the means for enforcing the data format further comprise means for tagging the extensible metadata such that is can be differentiated by a metadata consumer from the standard metadata.

61.	A computing device as recited in claim 59, wherein the means for enforcing the data format further comprise means for storing character strings associated with the extensible metadata.

62.	A computing device as recited in claim 59, wherein the extensible metadata comprises means for identifying layout of one or more tables.

63.   A computing device as recited in claim 59, wherein the extensible metadata comprises means for indexing a metadata table row and column and/or a metadata heap.

64.   A computing device as recited in claim 59, wherein the extensible metadata comprises means for representing coded tokens.

65.   A computing device as recited in claim 59, wherein the extensible metadata comprises means for providing type reference, type definition, type specification, field, method, event, and property information for extensible metadata coded tokens.

66.   A computing device as recited in claim 59, wherein the extensible metadata comprises means for presenting self-describing information for one or more new features, the information for each feature comprising a feature number, a substantially unique feature ID, a name of the feature.

67.   A computing device as recited in claim 59, wherein the extensible metadata further comprises means for suggesting an action for a metadata consumer to take with respect to a new feature presented by at least a portion of the extensible metadata the action indicating the metadata consumer must understand semantics of the new feature or may safely ignore the new feature.

68.   A computing device as recited in claim 67, wherein the extensible metadata further comprises multiple respective rows of data, each row being tagged as extended, and wherein the extensible metadata further comprises means for identifying a specific table and table row in the extensible metadata, a feature number associated with an extension identified by the table row, and an indication of one or more metadata consumer types that should understand the extension to properly function.

69.   A computing device as recited in claim 59, further comprising:

means for loading, by a metadata consumer, the assembly into memory managed by a runtime; and

means for interrogating, by the consumer, the runtime to discover presence of the extensible metadata, properties, and/or representation of the extensible metadata.

70.   A computing device as recited in claim 69, wherein the means for loading and interrogating are performed independent of modification to the consumer.

71.   A computing device as recited in claim 69, wherein the means for interrogating further comprise means for discovering data type definitions for a specific one of multiple extended features provided by the extensible metadata.

72.   A computing device as recited in claim 69, wherein the means for interrogating further comprise means for determining at least one suggested action to direct the consumer with respect to use of the extensible metadata.